REMARKS/ARGUMENTS

Claims 1, 4 and 9-15 were pending. Claims 1, 2, 4 and 9-15 are rejected. No claims were merely objected to and no claims were allowed. By entry of this amendment, no claims are canceled, claims 1, 10 and 15 are amended, and no new claims are added. Support for the claim amendments may at least be found at least at page 8, lines 6-22; page 11, lines 1-20; and page 18, lines 1-16 of the specification and Figure 3 as originally filed, as well as the claims and drawings as originally filed. No new matter is presented.

Claim Objections

The Examiner has objected to claim 15 due to informalities. Applicants traverse the rejection.

Applicants have amended claim 15 to correct the typographical error. The term "heat sodium collector" should have read "heated sodium collector" as recited, for example, in claim 9.

In light of the foregoing amendments, Applicants respectfully request the Examiner withdraw the objection to claim 15 and find claim 15 allowable.

Rejection under 35 U.S.C. §102(b)

The examiner asserts claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S.P.N. 4,780,270 to Hundal et al. ("Hundal"). Applicants traverse the rejection.

First, the examiner indicated on page 2, paragraph 2 of the Final Office Action mailed January 25, 2008 that he cannot agree with Applicants' remarks with respect to the teachings of Hundal. In particular, the Examiner disagrees with Applicants'

characterization of Hundal's teachings that the insulating gas space only affects the upper portion of the pressure vessel 3, and the pressure vessel 3 is directly connected to the basemat 15 through the annular support ring 16 and the pressure vessel is cooled through the same.

In Figure 1 of Hundal, the first gas space 7 insulates the reactor vessel 3 and the guard vessel 5 because it is filled with inert gas like nitrogen. In addition, there is the insulating bed 13 for thermal insulation between the reactor vessel 3 and the basemat 15, so cooling effect for the basemat 15 through the support ring 16 is extremely meager, which is different from what the examiner pointed out. (See col. 5, 20-35)

In addition, although cooling takes place through the basemat 15, this is heat loss that can take place at normal operations, not another cooling for additional removing decay heat under abnormal circumstances. Accordingly, Hundal's technical features are different from additional removing decay heat through the PVCS when a normal heat removal system breaks down.

On the contrary, Applicants' subject matter of amended claim 1 recites removing decay heat of the reactor when the pump is broken or the heat exchanger is out of order. Therefore, hot sodium in the hot pool overflows by thermal expansion toward the wall of the container (100) over a baffle (103) of the reactor in order to directly contact with the wall of the container (100) for another cooling as well as toward the sodium-sodium heat exchanger (See Fig. 8). Accordingly, Applicants' method of amended claim 1 also has even better decay heat removal effect since the claimed method removes heat by the Passive Vessel Cooling System (PVCS) through the wall of the container in addition to the sodium-sodium heat exchanger. Also additional

heat removal by the PVCS takes place in case of overflow by thermal expansion of hot sodium when the heat exchanger down, not under normal plant operation. Therefore, it is totally different from cooling through the basemat 15 in Hundal.

Referring now to Figure 1 below, Figure 1 illustrates a circulation flow path that passes through the cold pool and the hot pool in the present invention. At normal operations, a circulation flow path that passes the cold pool and the hot pool via IHX (Intermediate Heat Exchangers) to pump to reactor core like circulation flow path ① is formed. If the pump is broken or the IHX has problems, a circulation flow path ② that passes the cold pool and the hot pool via the sodium-sodium heat exchanger to pump to reactor core is additionally formed because the liquid level of the cold pool rises and sodium in the hot pool overflows, and the flow is not blocked although the pump is broken. Therefore, decay heat can be removed through circulation flow path ② although there are problems with the IHX.

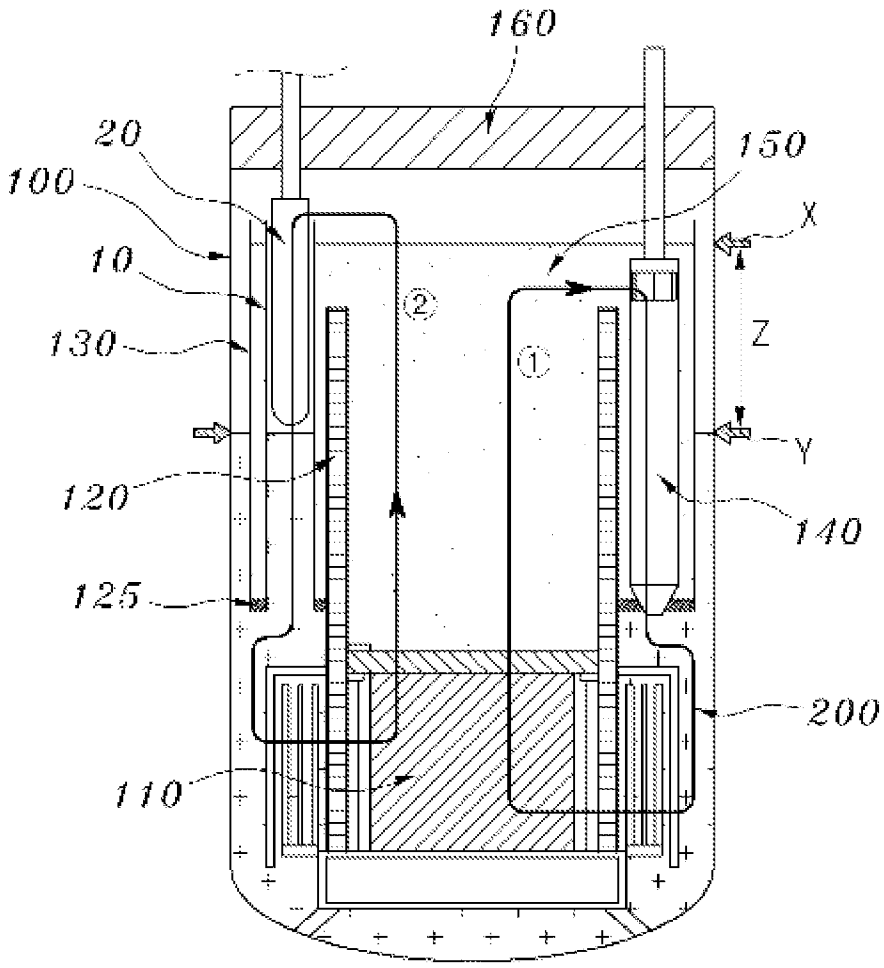

Figure 1

On the contrary, Figure 2 (shown below) presents a circulation flow path taught by Hundal. Although circulation flow path 'a' that passes the cold pool and the hot pool via heat exchanger 45 to pump 44 to reactor core 30 is formed at normal operations, in case of breakdown of the pump, sodium should flow like circulation flow path 'b' in order to form a circulation flow path like circulation flow path ② as recited in Applicants' amended claim 1. In contrast, Hundal teaches a global circulation flow path that passes the cold pool and the hot pool is not formed because circulation flow path 'b' is blocked with the first cylindrical wall 80, that is, lower section 86. Also in Hundal, there is a strong possibility that sodium does not

flow into the cold pool because the flow port 88 is blocked by freezing of sodium, and thus becoming solid sodium, although sodium flows through the flow port 88 formed on the lower section 86. That is, in the case of a breakdown of the pump, if sodium is cooled by the auxiliary heat exchanger in the annular space 93, there is a strong possibility that sodium will be frozen while passing the flow port 88 because the melting point of sodium is about 97.9℃ (208.22℉). The melting point of sodium is not very different from the temperature of sodium in the cold pool, considering the fact that sodium has good conductivity and the temperature of sodium in the annular space 93 will suddenly come down locally. Moreover, a circulation flow path like circulation flow path ② as recited in Applicants' claimed method is not formed. Again, in contrast, Hundal teaches at columns 8, lines 39-46 that the liquid level of the annular space 93 is maintained at 112 during normal operations and the liquid level rises equal to 110 through the flow port 88 in case of breakdown of the pump, and that the direction of the arrow regarding the flow of sodium in Figure 1 goes from the cold pool 40 toward the annular space 93.

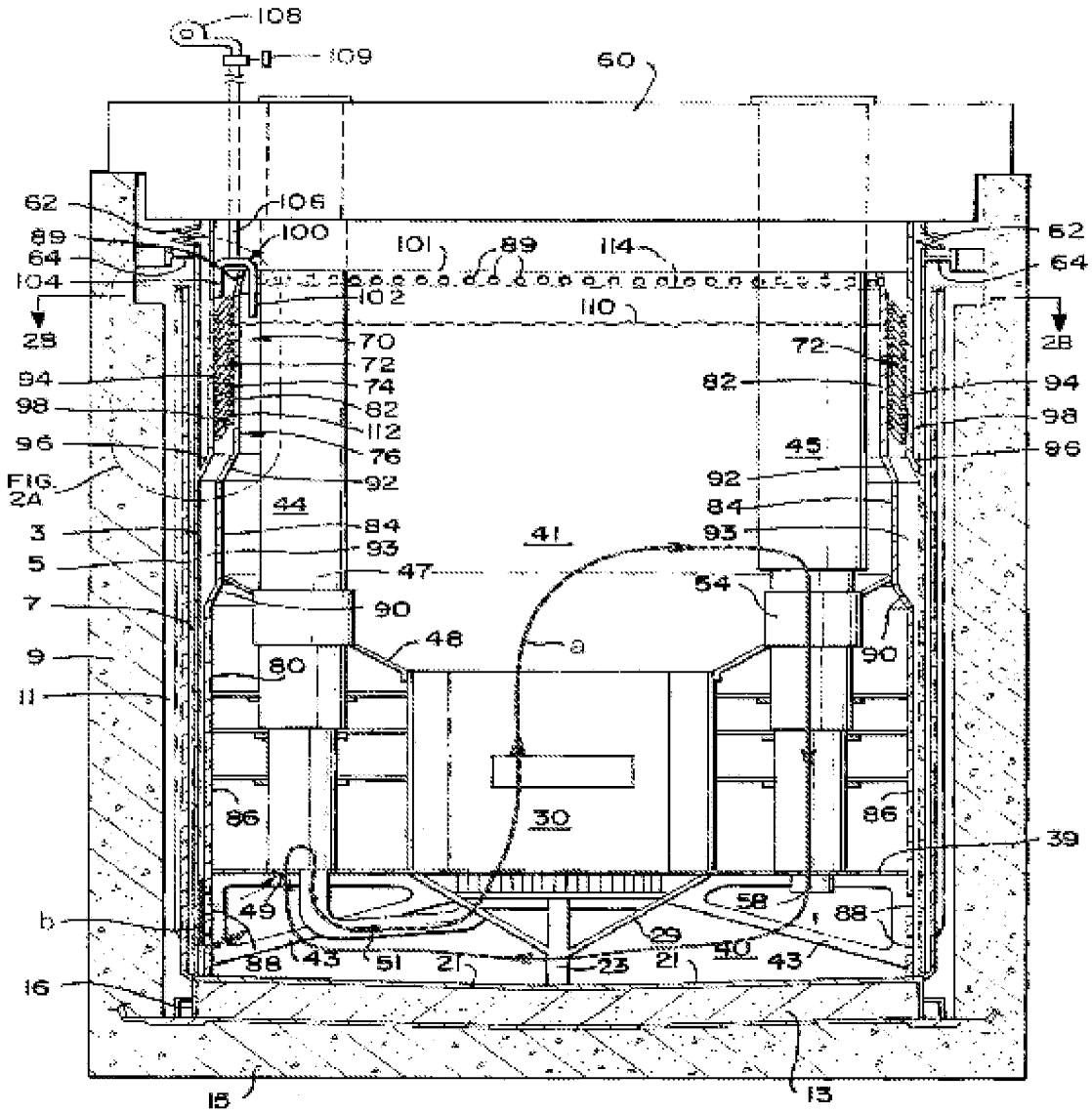

Figure 2

As stated above, it is deemed that the rejection under 35 USC §102 based on Hundal is not proper because Hundal neither discloses additional removal of decay heat by the PVCS mentioned in the present invention, nor a global circulation flow path that passes the hot pool and the cold pool at a time of breakdown of the pump as recited in Applicants' method of claims 1 and 4.

Lastly, Applicants draw the Examiner's attention to the following recitation of amended claim 1: "wherein a liquid metal

reactor comprises at least one circular vertical tube, a sodium-air heat exchanger and a sodium-sodium heat exchanger having a heated sodium collector, the sodium-sodium heat exchanger disposed within the circular vertical tube;". Hundal does not teach a liquid metal reactor having a sodium-air heat exchanger, a sodium-sodium heat exchanger having a heated sodium collector, where the sodium-sodium heat exchanger is disposed within the circular vertical tube.

For at least these reasons, Applicants contend claims 1 and 4 are not anticipated by the teachings of Hundal for the aforementioned reasons.

In light of the foregoing, Applicants respectfully request the examiner withdraw the rejection under 35 U.S.C. §102(b) and find claims 1 and 4 are allowable.

Rejections under 35 U.S.C. §103(a)

The examiner asserts claims 1 and 4 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S.P.N. 4,115,192 to Jogand ("Jogand") in view of U.S.P.N. 4,780,270 to Hundal et al. ("Hundal"). The examiner also asserts claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S.P.N. 4,115,192 to Jogand ("Jogand") in view of U.S.P.N. 4,780,270 to Hundal et al. ("Hundal"). Applicants traverse the rejection.

Applicants' claims 4 and 9 are dependent upon amended independent claim 1.

First, Applicants reiterate their remarks with respect to the teachings of Hundal as discussed above with respect to the rejection of claims 1 and 4 under 35 U.S.C. §102(b). Secondly, Applicants draw the Examiner's attention to the following recitation of amended claim 1: "wherein a liquid metal reactor comprises at least one circular vertical tube, a sodium-air

heat exchanger and a sodium-sodium heat exchanger having a heated sodium collector, the sodium-sodium heat exchanger disposed within the circular vertical tube;". Applicants contend neither Jogand nor Hundal teach a liquid metal reactor having a sodium-air heat exchanger, a sodium-sodium heat exchanger having a heated sodium collector, where the sodium-sodium heat exchanger is disposed within the circular vertical tube as recited in Applicants' amended claim 1. Moreover, Hundal also does fails to suggest the use of a liquid metal reactor having a sodium-air heat exchanger, a sodium-sodium heat exchanger having a heated sodium collector, where the sodium-sodium heat exchanger is disposed within the circular vertical tube. This lack of both teaching and suggestion by Hundal supports Applicants' contention that Hundal cannot provide the requisite motivation to alter the teachings of Jogand and their combined teachings cannot teach each and every element recited in Applicants' amended claim 1.

For at least these reasons, Applicants contend claims 1, 4 and 9 are all patentable and not obvious in light of the combined teachings of Jogand in view of Hundal.

In light of the foregoing, Applicants respectfully request the Examiner withdraw the rejections under 35 U.S.C. §103(a) and find claims 1, 4 and 9 are allowable.

Rejections under 35 U.S.C. §112

The Examiner asserts claims 10-15 are rejected under 35 U.S.C. §112, second paragraph. Applicants traverse the rejection.

Applicants have amended claim 10 to recite the following additional step: "providing a liquid metal reactor comprising at least one circular vertical tube, a sodium-air heat exchanger

and a sodium-sodium heat exchanger having a heated sodium collector, said sodium-sodium heat exchanger disposed within said circular vertical tube;". Applicants contend amended claim 10 now identifies a specific liquid metal reactor that uses sodium and has a sodium air heat exchanger, a sodium-sodium heat exchanger and a circular vertical tube containing these heat exchangers.

For at least these reasons, Applicants contend amended claim 10 is definite and particularly points out and distinctly claims the subject matter which Applicants regard as the invention.

In light of the foregoing, Applicants respectfully request the Examiner withdraw the rejection under 35 U.S.C. §112, second paragraph, and find claims 10-15 are allowable.

CONCLUSION

In light of the foregoing, it is submitted that all of the claims as pending patentably define over the art of record and an early indication of same is respectfully requested.

An earnest and thorough attempt has been made by the undersigned to resolve the outstanding issues in this case and place same in condition for allowance. If the Examiner has any questions or feels that a telephone or personal interview would be helpful in resolving any outstanding issues which remain in this application after consideration of this amendment, the Examiner is courteously invited to telephone the undersigned and the same would be gratefully appreciated.

It is submitted that the claims as amended herein patentably define over the art relied on by the Examiner and early allowance of same is courteously solicited.

If any fees are required in connection with this case, it is respectfully requested that they be charged to Deposit Account No. 02-0184.

Respectfully submitted,

JAE-HYUK EOH ET AL.

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